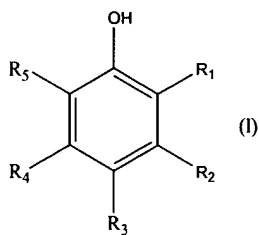


What is Claimed is:

1. A compound of Formula I:



Wherein  $R_1$  and  $R_5$  are each independently selected from the group consisting of hydrogen, a  $C_2$  through  $C_{12}$  straight chain alkyl, a  $C_3$  through  $C_{12}$  branched alkyl group, and a  $C_3$  through  $C_6$  cycloalkyl group; and

$R_2$ ,  $R_3$  and  $R_4$  are each independently selected from the group consisting of hydrogen, a  $C_3$  through  $C_{12}$  straight chain alkyl optionally substituted with hydroxyl, a  $C_3$  through  $C_{12}$  branched alkyl optionally substituted with hydroxyl, and a  $C_3$  through  $C_6$  cycloalkyl optionally substituted with hydroxyl.

With the proviso that

At least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  are selected from the group consisting of a  $C_2$  through  $C_{12}$  straight chain alkyl, a  $C_3$  through  $C_{12}$  branched alkyl

group, and a C<sub>3</sub> through C<sub>6</sub> cycloalkyl group;

and

At least one of R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> are selected from the group consisting of a C<sub>3</sub> through C<sub>12</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>12</sub> branched hydroxyalkyl or a C<sub>3</sub> through C<sub>6</sub> hydroxycycloalkyl; and

each of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> are not tert-butyl.

2. The compound of claim 1 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl, a C<sub>3</sub> through C<sub>8</sub> branched alkyl group, and a C<sub>3</sub> through C<sub>6</sub> cycloalkyl group.
3. The compound of claim 1 wherein at least one of R<sub>2</sub>, R<sub>3</sub>, and R<sub>4</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl or a C<sub>3</sub> through C<sub>6</sub> hydroxycycloalkyl.
4. The compound of claim 2 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl.
5. The compound of claim 2 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> branched alkyl.

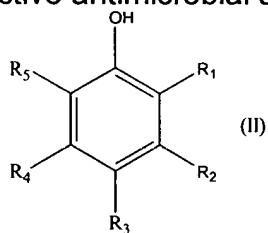
6. The compound of claim 2 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_6$  cycloalkyl.
- 5 7. The compound of claim 2 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of methylethyl and 2-methylpropyl.
8. The compound of claim 3 wherein at least one of  $R_2$ ,  $R_3$ , and  $R_4$  is selected from the group consisting of a  $C_3$  through  $C_8$  straight chain hydroxyalkyl.
- 10 9. The compound of claim 3 wherein at least one of  $R_2$ ,  $R_3$ , and  $R_4$  is a  $C_3$  through  $C_8$  branched hydroxyalkyl.
10. The compound of claim 3 wherein at least one of  $R_2$ ,  $R_3$ , and  $R_4$  is selected from the group consisting of a  $C_3$  through  $C_6$  hydroxycycloalkyl.
- 15 11. The compound of claim 3 wherein at least one of  $R_2$ ,  $R_3$ , and  $R_4$  is selected from the group consisting of 1-hydroxypropyl, 2-hydroxypropyl, 3-hydroxypropyl, 1-hydroxybutyl, 2-hydroxybutyl, 3-hydroxybutyl, and 4-hydroxybutyl .
- 20

12. The compound of claim 2 wherein  $R_3$  is selected from the group consisting of a  $C_3$  through  $C_{12}$  straight chain hydroxyalkyl, a  $C_3$  through  $C_{12}$  branched hydroxyalkyl or a  $C_3$  through  $C_6$  hydroxycycloalkyl.

5

13. An antimicrobial composition comprising an antimicrobial acceptable carrier and an effective antimicrobial amount of at least one compound of

Formula (II):



10

Wherein  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  are each independently selected from the group consisting of hydrogen, a  $C_1$  through  $C_{12}$  straight chain alkyl optionally substituted with hydroxyl, a  $C_3$  through  $C_{12}$  branched alkyl optionally substituted with hydroxyl, and a  $C_3$  through  $C_6$  cycloalkyl optionally substituted with hydroxyl;

15

With the proviso that

20

At least one of  $R_1$ ,  $R_2$ ,  $R_4$ ,  $R_3$  and  $R_5$  are selected from the group consisting

of a C<sub>1</sub> through C<sub>12</sub> straight chain alkyl, a C<sub>3</sub> through C<sub>12</sub> branched alkyl group, and a C<sub>3</sub> through C<sub>6</sub> cycloalkyl group; and

At least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>4</sub>, R<sub>3</sub> and R<sub>5</sub> are selected from the group consisting of a C<sub>1</sub> through C<sub>12</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>12</sub> branched hydroxyalkyl or a C<sub>3</sub> through C<sub>6</sub> hydroxycycloalkyl.

14. The antimicrobial composition of claim 13 wherein the antimicrobial effective carrier is selected from the group consisting of water, saline, alcohol, glycerin, propylene glycol, mineral oil, petrolatum and mixtures thereof.
15. The antimicrobial composition of claim 13 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl, a C<sub>3</sub> through C<sub>8</sub> branched alkyl group, and a C<sub>3</sub> through C<sub>6</sub> cycloalkyl group.
16. The antimicrobial composition of claim 13 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl group, and a C<sub>3</sub> through C<sub>6</sub> hydroxycycloalkyl group.

17. The antimicrobial composition of claim 15 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_8$  straight chain alkyl.
- 5 18. The antimicrobial composition of claim 15 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_8$  branched alkyl.
- 10 19. The antimicrobial composition of claim 15 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_6$  cycloalkyl.
- 15 20. The antimicrobial composition of claim 15 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of methylethyl and 2-methylpropyl.
- 20 21. The antimicrobial composition of claim 16 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_8$  straight chain hydroxyalkyl.
22. The antimicrobial composition of claim 16 wherein at least one  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is a  $C_3$  through  $C_8$  branched hydroxyalkyl.

23. The antimicrobial composition of claim 16 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_6$  hydroxycycloalkyl.
24. The antimicrobial composition of claim 16 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of 1-hydroxypropyl, 2-hydroxypropyl, 3-hydroxypropyl, 1-hydroxybutyl, 2-hydroxybutyl, 3-hydroxybutyl, and 4-hydroxybutyl.
25. The antimicrobial composition of claim 16 wherein  $R_3$  is selected from the group consisting of a  $C_3$  through  $C_{12}$  straight chain hydroxyalkyl, a  $C_3$  through  $C_{12}$  branched hydroxyalkyl or a  $C_3$  through  $C_6$  hydroxycycloalkyl.
26. The antimicrobial composition of claim 25 wherein  $R_3$  is selected from the group consisting of 4-hydroxybutyl and butan-2-ol.
27. The antimicrobial composition of claim 13 wherein the antimicrobial effective amount is from about 0.0001 to 10% by weight of the total weight of the antimicrobial composition.

28. The antimicrobial composition of claim 27 wherein the antimicrobial effective amount is from about 0.001 to 5% by weight of the total weight of the antimicrobial composition.
- 5 29. An oral composition comprising an orally acceptable carrier and an effective antimicrobial amount of at least one compound of Formula (II):
30. The oral composition of claim 29 wherein the orally acceptable carrier is selected from the group consisting of water, saline, alcohol, glycerin,  
10 propylene glycol, and mixtures thereof.
31. The oral composition of claim 29 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl, a C<sub>3</sub> through C<sub>8</sub> branched alkyl group, and a C<sub>3</sub> through C<sub>6</sub> cycloalkyl  
15 group.
32. The oral composition of claim 29 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl group, and a C<sub>3</sub>  
20 through C<sub>6</sub> hydroxycycloalkyl group.
33. The oral composition of claim 31 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and



R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl.

34. The oral composition of claim 31 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and  
5 R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> branched alkyl.

35. The oral composition of claim 31 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and  
R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>6</sub> cycloalkyl.

10 36. The oral composition of claim 31 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and  
R<sub>5</sub> is selected from the group consisting of methylethyl and 2-  
methylpropyl.

37. The oral composition of claim 32 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and  
15 R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain  
hydroxyalkyl.

38. The oral composition of claim 32 wherein at least one R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub>  
is a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl.

20 39. The oral composition of claim 32 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and  
R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>6</sub>

hydroxycycloalkyl.

40. The oral composition of claim 32 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of 1-hydroxypropyl, 2-hydroxypropyl, 3-hydroxypropyl, 1-hydroxybutyl, 2-hydroxybutyl, 3-hydroxybutyl, and 4-hydroxybutyl.
41. The oral composition of claim 32 wherein  $R_3$  is selected from the group consisting of a  $C_3$  through  $C_{12}$  straight chain hydroxyalkyl, a  $C_3$  through  $C_{12}$  branched hydroxyalkyl or a  $C_3$  through  $C_6$  hydroxycycloalkyl.
42. The oral composition of claim 41 wherein  $R_3$  is selected from the group consisting of 4-hydroxybutyl and butan-2-ol.
43. The oral composition of claim 29 wherein the antimicrobial effective amount is from about 0.0001 to 10% by weight of the total weight of the oral composition.
44. The oral composition of claim 43 wherein the antimicrobial effective amount is from about 0.001 to 5% by weight of the total weight of the oral composition.

45. The oral composition of claim 29 further comprising at least one essential oil.
46. The oral composition of claim 45 wherein the at least one essential oil is selected from the group consisting of thymol, menthol, eucalyptol, methyl salicylate, and combinations thereof.
47. The oral composition of claim 46, wherein the essential oil comprises:  
an amount of from about 0.005 to 0.5 % menthol;  
an amount of from about 0.005 to 0.5 % eucalyptol;  
an amount of from about 0.005 to 0.5 % methyl salicylate; and  
an amount of from about 0.005 to 0.5 % thymol.
48. A method of reducing the presence of microorganisms on a substrate comprising treating the substrate with an effective amount of the antimicrobial composition of claim 13.
49. The method of claim 48 wherein the antimicrobial effective carrier is selected from the group consisting of water, saline, alcohol, glycerin, propylene glycol, mineral oil, petrolatum, and mixtures thereof.
50. The method of claim 48 wherein the antimicrobial effective amount is from about 0.0001 to 10% by weight.

51. The method of claim 50 wherein the antimicrobial effective amount is from about 0.001 to 5% by weight.
- 5 52. The method of claim 48 wherein the antimicrobial composition is in the form of a member selected from the group consisting of a deodorant, a soap, an ointment, and a cream.
- 10 53. A method of reducing the presence of microorganisms in an oral cavity comprising administering into the oral cavity a microorganism-reducing effective amount of the method of claim 48.
- 15 54. The method of claim 53 wherein the orally acceptable carrier is selected from the group consisting of water, saline, alcohol, glycerin, propylene glycol, and mixtures thereof.
- 20 55. The method of claim 53 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_8$  straight chain alkyl, a  $C_3$  through  $C_8$  branched alkyl group, and a  $C_3$  through  $C_6$  cycloalkyl group.
56. The method of claim 53 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is

selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain hydroxyalkyl, a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl group, and a C<sub>3</sub> through C<sub>6</sub> hydroxycycloalkyl group.

- 5            57.    The method of claim 55 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain alkyl.
58.    The method of claim 55 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> branched alkyl.
- 10           59.    The method of claim 55 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>6</sub> cycloalkyl.
60.    The method of claim 55 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of methylethyl and 3-methylpropyl.
- 15           61.    The method of claim 56 wherein at least one of R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is selected from the group consisting of a C<sub>3</sub> through C<sub>8</sub> straight chain hydroxyalkyl.
62.    The method of claim 56 wherein at least one R<sub>1</sub>, R<sub>2</sub>, R<sub>3</sub>, R<sub>4</sub> and R<sub>5</sub> is a C<sub>3</sub> through C<sub>8</sub> branched hydroxyalkyl.
- 20

63. The method of claim 56 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of a  $C_3$  through  $C_6$  hydroxycycloalkyl.
- 5 64. The method of claim 56 wherein at least one of  $R_1$ ,  $R_2$ ,  $R_3$ ,  $R_4$  and  $R_5$  is selected from the group consisting of 4-hydroxybutyl and butan-2-ol.
65. The method of claim 56 wherein  $R_3$  is selected from the group consisting of a  $C_3$  through  $C_{12}$  straight chain hydroxyalkyl, a  $C_3$  through  $C_{12}$  branched  
10 hydroxyalkyl or a  $C_3$  through  $C_6$  hydroxycycloalkyl.
66. The method of claim 65 wherein  $R_3$  is selected from the group consisting of 4-hydroxybutyl and butan-2-ol.
- 15 67. The method of claim 53 wherein the antimicrobial effective amount is from about 0.0001 to 10% by weight.
68. The method of claim 67 wherein the antimicrobial effective amount is from about 0.001 to 5% by weight.
- 20 69. The method of claim 53 wherein the oral composition is in the form of a member selected from the group consisting of a mouthrinse, a dentifrice, a

chewing gum, a dispersible oral film, a lozenge, and an oral film forming dentifrice.